

[54] **ULTRASHORT PULSE MULTICHANNEL INFRARED SPECTROMETER APPARATUS AND METHOD FOR OBTAINING ULTRAFAST TIME RESOLUTION SPECTRAL DATA**

[75] Inventor: Edwin J. Heilweil, Rockville, Md.

[73] Assignee: The United States of America as represented by the Secretary of Commerce, Washington, D.C.

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Primary Examiner—Carolyn E. Fields

Attorney, Agent, or Firm—Thomas Zack; Alvin J.

Englert; Chittaranjan N. Nirmel

[57] ABSTRACT

A simple, compact optical spectrometer employs solid-state nonlinear crystals for obtaining broadband multichannel infrared spectra with picosecond or femtosecond time resolution. Spectrally broad infrared pulses are produced by difference frequency mixing in a first LiIO_3 crystal between the second harmonic of a picosecond Nd^{+3} :YAG laser and broadband output of a synchronously pumped dye laser, and a resultant broadband IR pulse is upconverted by a second LiIO_3 crystal to yield a blue visible pulse which is dispersed by a 0.25 meter spectrograph onto a multichannel vidicon or reticon detector to obtain four wavenumber resolution single-shot transient infrared spectra of a sample. The present invention enables rapid acquisition of ultrashort time infrared spectra over a broadly tunable spectral range (in the mid to near infrared) at minimal cost and by a simple but versatile optical system employing readily available components.

20 Claims, 5 Drawing Sheets